

Golder Associates Inc.

1630 Heritage Landing, Suite 103
St. Charles, MO USA 63303
Telephone (314) 936-1554
Fax (314) 936-1135

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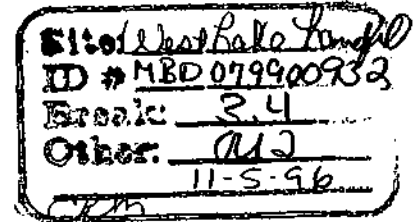
SUPERFUND DIVISION



November 5, 1996

Our Ref: 943-2848

Mr. Steven Kinser
US Environmental Protection Agency
Region VII
WSTM/SPFD/REML
726 Minnesota Avenue
Kansas City, Kansas 66101



**RE: RESPONSES TO EPA COMMENTS ON THE "PHYSICAL
CHARACTERIZATION TECHNICAL MEMORANDUM", WEST LAKE
LANDFILL OPERABLE UNIT 2 RI/FS**

Dear Mr. Kinser:

This letter provides responses to comments made by the US Environmental Protection Agency (EPA) on the above-referenced document. EPA comments were provided in a September 27, 1996 letter.

The following responses to EPA comments are submitted on behalf of Laidlaw Waste Systems, Inc. (Laidlaw). The EPA comments are reproduced verbatim and are followed by a detailed response. It is understood that the EPA comments include a page number and section number reference.

The text of the memorandum has been changed as indicated in each individual response.

✓ **Comment No. 1:** 1-3/1.4 - *For clarity, a comma should be placed between groundwater and surface water in the third line of this section's first paragraph.*

Response: The suggested revision has been made.

✓ **Comment No. 2:** 2-3/2.3 - *The phrase "which was formed" should be changed to "which were formed" in the third line on this page.*

Response: The suggested revision has been made.

○ **Comment No. 3:** 2-3/2.3 - *In the last and next to the last paragraph of this section, the term "slow" is used to describe the permeability of the soil. It would probably be more accurate to use the word "low" instead.*

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Response: As stated on page 2-2, Section 2.3 is based on information presented by the US Soil Conservation Service (SCS). The SCS uses the term "slow" when describing the permeability of the Freeburg unit. The sentence has been revised to more clearly indicate that the term "slow" is an SCS designation.

✓ **Comment No. 4: 2.4 - General -** *The word 'series' is usually capitalized when it follows a specific formation name, as it has been done in Section 4.1.*

Response: The text has been revised to capitalize "series" when it follows a specific formation name.

✓ **Comment No. 5: 2-4 / 2.4.1 -** *Should not the reference in the third line of the second paragraph on this page be Kinderhookian Series rather than Formation?*

Response: The reference has been changed to Kinderhookian Series.

✓ **Comment No. 6: 2-6 / 2.5.1 -** *The fourth line of the second paragraph on this page should read, "Mississippian-age Meramecian Series" rather than 'series formations'.*

Response: The suggested revision has been made.

✓ **Comment No. 7: 2-6 / 2.5.1 -** *In the third paragraph the reference to the shale would probably be more clear if it were written, "The Ordovician-age Maquoketa shale of the Cincinnati-series, underlying these systems,".*

Response: The suggested revision has been made.

✓ **Comment No. 8: 3-6 / 3.2.1 -** *In the second paragraph when describing the disposable gloves, the word new is enclosed in parentheses. In the following sentence, the description of the plastic sheeting also includes the word new, but it is not enclosed in parentheses. I would assume that the first instance indicates that the option of using either 'clean' or 'new' gloves was given while in the second the only choice was to use 'clean new' plastic sheeting. If this is correct, no change is necessary.*

✓ **Response:** The sentences have been revised to include the word "clean" without reference to "new" and without parentheses.

OK ✓ **Comment No. 9: Figure 3-2 -** *This figure shows that the screened interval of the borehole has been grouted with a cement/bentonite grout. My assumption is that this is not the case. This is not the only problem with the figure; additional modifications will be necessary to complete the figure. I am enclosing a copy of the figure with some suggested modifications. These should guide you in redrafting the figure to show what was actually constructed. It would be beneficial for a well construction diagram for each well to be used in the*

monitoring system to be included, or at least a table of elevations for the various elements to provide specific details as to the construction of each well in the monitoring system, and a figure showing a typical long-screened interval Piezometer.

Response: Figure 3-2 has been revised to incorporate the suggested changes and to ensure consistency with actual construction.

Well construction diagrams for all piezometers installed as part of the OU-2 RI/FS are provided in Volume III, Appendix E. Table 3-3 of the report details OU-2 piezometer locations and pertinent elevations, including top of PVC casing, ground surface, and bottom and top of screened interval.

Long-screened piezometers differ from other recently constructed piezometers only with regard to screen length. Notations have been added to Figure 3-2 stating that screen lengths are detailed in Appendix E.

Comment No. 10: Table 3-3 - General - I assume that all data taken for this table were available to the nearest 1/100th of a foot since the majority of the data are reported that way. For consistency, all data should be reported to the nearest 1/100th of a foot. The table should also include a note detailing which reference system was used for both horizontal and vertical data.

Response: The suggested revisions have been made. Ground surface data were reported to the nearest 1/10th of a foot, due to variable ground terrain.

Comment No. 11: 3.2.2.1 - General - It is unclear what the annular space above the bentonite seal is backfilled with. Figure 3-2 indicates bentonite grout was used, but that figure appears to be unreliable.

Response: The revisions to Figure 3-2 discussed in EPA comment No. 9 above provide consistency between the text and the figure.

Comment No. 12: 3.2.6.1 - General - A minor editorial comment. This section shifts tense from the past, as used in previous sections, to the present tense.

Response: Section 3.2.6.1 used the present tense when describing water level monitoring because this type of monitoring was continuing at the time the "Physical Characterization Technical Memorandum" was submitted. Subsequent to submittal of the memorandum, water level monitoring requirements have been met and the monitoring has been discontinued. The text has now been revised to use past tense verbs.

Comment No. 13: 4-4 / 4.1.1.3 - The second paragraph is slightly confusing. Perhaps it could be restated to say that "fractures were rare with zero to two fractures per foot."

Response: The second paragraph has been revised as follows: "Fractures were rare in the Salem Formation. The lower portion of the formation generally exhibited zero to one fracture per foot. The upper portion of the formation generally exhibited up to two fractures per foot. The fractures were characterized as jointed, irregular, and rough; or, as jointed, planar, and smooth."

OK **Comment No. 14: 4-14 & 15 -** *These two sections on the Deep Salem Formation and the St. Louis/Upper Salem Formation concluded that ground water flow is towards the active landfill, and I have no argument with that, as far as it goes. Data from the northern and western portion of the site have not been collected that would allow the same conclusion for that area. There is the potential for a ground- water divide similar to the one observed in the unconsolidated material to be present. This needs to be addressed.*

Response: The text has been revised to incorporate the phrase "near the active landfill" when referring to direction of groundwater flow within the Deep Salem Formation and St. Louis/Upper Salem Formation.

It is agreed that a groundwater divide may be present within the Deep Salem Formation and St. Louis/Upper Salem Formation at some distance from the active landfill, as a result of the inferred gradient reversal caused by limestone quarrying and leachate pumping. However, available hydrogeologic data do not appear to warrant additional piezometers in the Deep Salem Formation and St. Louis/Upper Salem Formation in the northern and western portions of the site. The alluvial thickness in these areas is in excess of 100 feet. Any groundwater impacts, should they occur, would be detected by monitoring the alluvial groundwater. Operable Unit 1 has completed groundwater quality sampling of the alluvial groundwater in the northern and western portions of the site. Operable Unit 2 has proposed additional alluvial groundwater quality sampling in the western portion of the site. These data can be used to characterize potential impacts to groundwater quality that can then be used to determine the need for supplemental monitoring points, if any.

OK **Comment No. 15: 4-28 / 4.3.1 -** *This section makes a conclusion that is probably true, but is not specifically supported by the data provided in Table 34. Basin-wide precipitation certainly would have the stated effect, but local precipitation may or may not have the same effect. Note particularly that in November precipitation and river stages are trending in opposite directions.*

Response: The text of Section 4.3.1 has been revised to more clearly discuss the potential relationship between site precipitation and Missouri River stage.

OK **Comment No. 16: 4-29 / 4.3.2 -** *Is there a source of data to support the statement that precipitation falling into the active landfill is estimated to contribute an average of about 99,000 gallons per day? If so, it would be helpful to include that information in the report.*

Response: The estimate of precipitation recharge is based on a mathematical computation. The computation is based on known data, including an approximate 36-acre active landfill footprint and 37-inches of precipitation per year at the site. Conservatively assuming no evaporation, and recognizing that no runoff can occur from the currently below-grade active landfill, 37-inches of precipitation falling on a 36-acre landfill yields approximately 99,000 gallons per day of leachate.

The text has been revised to more clearly indicate the method used to determine 99,000 gallons per day of leachate generated from precipitation.

✓ **Comment No. 17: 5-2 / 5.2** - *In the last sentence in the second paragraph in this section, the word 'units' should be replaced with 'formations' and the word 'formations' dropped from 'series formations' and Series capitalized.*

Response: The suggested revisions have been made.

✓ **Comment No. 18: 5-5 / 5.4** - *Would it be more accurate to use the term 'deep Salem, St. Louis/Upper Salem' instead of the term "Salem, St. Louis" in the fourth line of this section?*

Response: The suggested revisions have been made.

✓ **Comment No. 19: 6-1 / 6.1** - *Would it be more accurate to use the term "St. Louis" rather than "St. Louis/Upper Salem" in the seventh line of the first paragraph of this section?*

Response: It is considered more appropriate to revise the sentence to read "Groundwater monitoring for the alluvial and upper two bedrock hydrologic units (i.e., St. Louis/Upper Salem Formation and Deep Salem Formation) is proposed." The text has been revised accordingly.

✓ **Comment No. 20: 6 - General** - *The proposed monitoring network does not appear to be monitoring the northern portion of the Site. In addition, there appears to be only one monitoring well to the west of the observed groundwater divide. Leachate monitoring well LR-102 is not included in the monitoring system; is there a reason for this? Why were none of the existing wells used in developing the characterization?*

Response: Figure 6-1 illustrates the proposed monitoring network. As shown on Figure 6-1, groundwater quality in the northern portion of the site is proposed to be monitored by piezometers PZ-208-SS, PZ-114-AS, and monitoring wells I-68, S-84, D-85, I-67, I-66, MW-F3, D-13, and I-65. Piezometer PZ-208-SS has not previously been sampled. Piezometer PZ-114-AS and monitoring wells I-68, S-84, D-85, I-67, I-66, MW-F3, D-13, and I-65 were included in Operable Unit 1 sampling. Accordingly, groundwater quality data will be available from 10 points spaced across the northern portion of the site.

Figure 6-1 illustrates 16 monitoring wells and piezometers (i.e., S-8, I-62, D-83, MW-101, I-7, D-6, S-61, I-2, S-1, D-93, I-9, S-82, MW-103, PZ-304-AS, PZ-304-AI, and PZ-303-AS) along the western portion of the site. Fourteen of the monitoring wells and piezometers were included in Operable Unit 1 sampling. These data are proposed to be supplemented with four additional groundwater sampling points as part of the Operable Unit 2 RI/FS. These data should provide excellent coverage of groundwater quality on the western portion of the site.

Leachate riser LR-102 is not included in the proposed monitoring network because the leachate thickness in LR-102 has consistently been approximately six inches or less. Leachate riser LR-102 is not expected to yield sufficient leachate for sampling. The text has been revised accordingly.

Data obtained from the existing wells has been used throughout the physical characterization of the site. As discussed above, Operable Unit 2 has proposed to incorporate groundwater quality data from existing wells and piezometers sampled by Operable Unit 1 to provide site-wide groundwater quality information, when combined with the proposed Operable Unit 2 sampling points. As shown on Figure 4-1, existing monitoring well MW-F1D was used to assist in developing a geologic cross-section for the site. Water level data from all existing wells and piezometers have been collected on a monthly basis and have been used to develop water table maps to illustrate groundwater flow directions at the site. In summary, the existing wells and piezometers have been referenced extensively when characterizing the physical conditions at the site.

Figure 6-1 has been revised to more clearly identify the OU-1 monitoring wells.

Miscellaneous EPA Comment: There is significant need to further explain the rationale of the proposed monitoring system, particularly that portion of the system that was not included.

Response: Response to EPA comment No. 20 above indicates that groundwater sampling is proposed to be conducted on all sides of the site. Groundwater quality sampling is proposed to be conducted in the alluvium, the St. Louis/Upper Salem hydrologic unit, and the Lower Salem hydrologic unit to determine groundwater quality horizontally and vertically at the site. Operable Unit 2 proposes to collect groundwater quality samples from 24 wells and piezometers, eight leachate risers, two surface water locations and two sediment locations. In summary, 36 Operable Unit 2 locations are proposed for chemical characterization. The 36 Operable Unit 2 sampling locations are supplemented with data available from 28 wells and piezometers sampled by Operable Unit 1. In total, Operable Unit 1 and Operable Unit 2 sampling results will be available from 54 separate sampling locations spread across the entire site. Rainwater/runoff samples, seep samples, landfill gas samples, etc. are also included in the Operable Unit 1/Operable Unit 2 site characterization activities.

The extensive, widespread sampling points are considered sufficient to yield appropriate data for characterizing site environmental conditions, for use in risk assessment determinations, and for evaluating remedial alternatives as part of the feasibility study phase of the project.

We trust that these responses adequately address the comments. To facilitate incorporation of the responses, enclosed is a complete text of the report, along with revised Table 3-3, and revised Figures 3-2 and 6-1. Please replace the previous text with the attached text, and replace Table 3-3, Figure 3-2, and Figure 6-1 with the attached. All other information presented in the original submittal remains current.

Groundwater, surface water, sediment, and leachate sampling activities will await EPA's concurrence with the monitoring network to allow EPA the opportunity to evaluate the responses provided above and the text revisions.

Sincerely,

GOLDER ASSOCIATES INC.



Ward E. Herst, PE, CPHG, CEM
Operations Manager - St. Louis
Associate

WEH/cl

epa.doc

Attachments

cc: Jalal El-Jayyousi - MDNR
Doug Borro - Laidlaw Waste Systems
Michael Hockley - Spencer, Fane, Britt & Browne
Paul Rosasco - Engineering Management Support

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CLIENT/PROJECT

L A I D L A W
LAIDLAW WASTE SYSTEMS INC.

**WEST LAKE LANDFILL
OPERABLE UNIT 2**

TITLE

SITE FEATURES MAP

Denver, Colorado



**Golder
Associates**

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Denver, Colorado

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**WEST LAKE LANDFILL
OPERABLE UNIT 2**
LANDLAW WASTE SYSTEMS INC.

TITLE

SITE VICINITY MAP

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FIGURE NO. 2-2



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Denver, Colorado

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**WEST LAKE LANDFILL
OPERABLE UNIT 2**
LADLAW WASTE SYSTEMS INC.

TITLE

SITE LOCATION MAP

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FIGURE NO. **2-2**

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L A I D L A W
LAIDLAW WASTE SYSTEMS INC.

BRIDGETON ACTIVE
SANITARY LANDFILL

TITLE

MONITORING POINTS
LOCATION MAP

Denver, Colorado



**Golder
Associates**

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**WEST LAKE LANDFILL
OPERABLE UNIT 2**

TITLE

SITE FEATURES MAP

Denver, Colorado



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